MOVIETONE BULLETIN

Published in the interest of the Movietone Projectionist by

FOX CASE CORPORATION

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The Photo-Electric Cell

REALLY, I don't think much of that name. Just who tacked it on this rather marvelous piece of equipment I do not know, but certainly the selection might have been somewhat improved. One would infer it had something to do with a battery, though even so, just where the "photo" end comes in deponent sayeth not.

It really is an electric valve, the chief elements of which have ability to transform light into electrical action, and vary the strength of the latter in exact proportion to variations in the strength, (intensity), of the former. At least that is what it does as it is used in movietone equipment.

Light passing through the highly variable densities of the movietone film sound band falls upon, or using the correct optical term, becomes incident upon the sensitive element of the photo-electric cell, (Western Electric Code No. 1-A), sets up an electric current, or permits an electric current to flow, the strength of which will be exactly proportionate to the intensity of the light which, as you may readily understand, varies widely and with enormous rapidity as the lines upon the sound band pass through the light beam emanating from the exciting lamp.

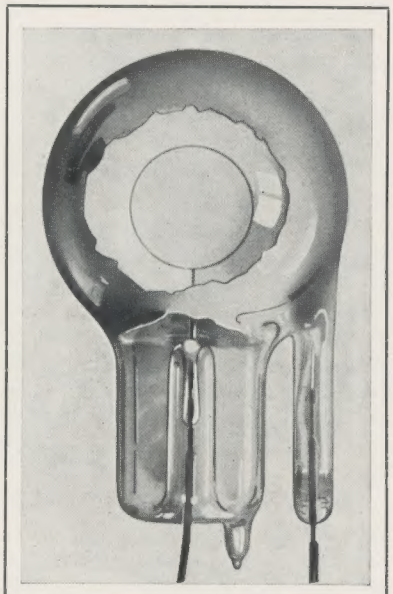

Fig. 1. The photo-electric cell.

A photo-electric cell consists of the usual glass covering tube, illustrated in figure 1, into which, through air-tight seals, pass two wires, one of which connects to the round conductor, (the "anode"), in the center of the cell. See figures 1, 2 and 3. This is the positive electrode. It must always be connected to the positive, (+), wire of the electric circuit to which the cell is connected.

Upon the inner surface of the glass is a thin deposit of silver, and upon its inner surface is a light sensitive material to which the negative, (—), wire of the circuit connects. The silver coating is deposited upon the glass surface of the bulb, over the negative or cathode wire, in order to effect a better electrical connection between the wire and the light sensitive material deposited on the surface of the silver.

Silver is a most excellent conductor of electricity, and since it connects with the wire, and the light sensitive material connects with the silver at every point of its surface, the action is better than it would be were the light sensitive material,

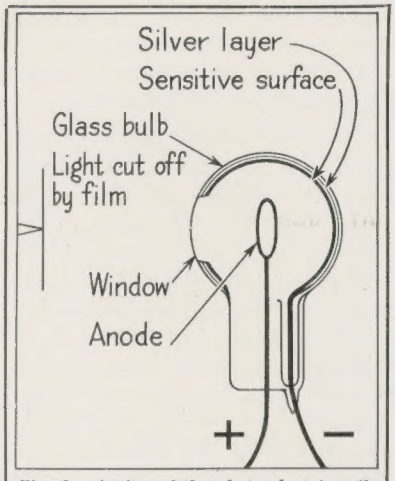

Fig. 2. Action of the photo-electric cell. Light cut off by film. No current can flow.

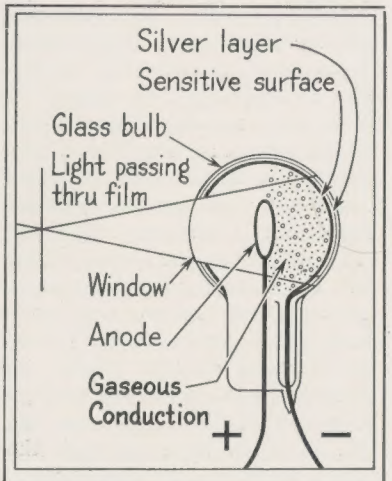

Fig. 3. Action of the photo-electric cell. Light entering cell. Current can flow.

which is not such an excellent electrical conductor as silver, only connected to the wire at one point. A bit complicated in wording, but I think you will grasp the idea.

On the side of the tube next the light source a round opening is left in the silver and light sensitive coating, so that the light may enter freely and thus become incident upon the sensitive material.

The light sensitive material we have been talking about is a special form of the metal potassium. When properly treated it usually has a beautiful blue color.

Aside from the silver and potassium, there is a small quantity of a rare gas, the purpose of which we will presently explain. The photo-electric cell seems simple enough to look at, but its manufacture is a highly technical and very complicated process.

We have now described the cell in so far as has to do with its various elements. Next let us consider the valve action of these elements.

The cell is connected in circuit with a 90 volt battery, the lead from the ring-shaped anode connecting to the positive terminal, and the other lead to the negative.

When the light sensitive material upon its inner surface is not illuminated, the gas before mentioned is in its natural state, and is a nonconductor of electricity. The cathode and anode of the cell, therefore, are insulated from each other, and no current can flow.

Let us now presume the exciting lamp to have been lighted, thus illuminating the interior of the cell. Under this condition an instant and very radical change takes place. Electrons, (negatively charged particles of electricity), are thrown off by the light sensitive material under the action of the light. These electrons ionize the gas, in which condition it becomes an excellent conductor of electricity and, using it as a conductor, the electrons flow from the cathode, (light sensitive material), to the anode, (ring shape conductor in center of cell), and thus a weak electric current is established between the two through the action of the light upon the light sensitive material and the voltage impressed by the battery. This current will, of course, flow

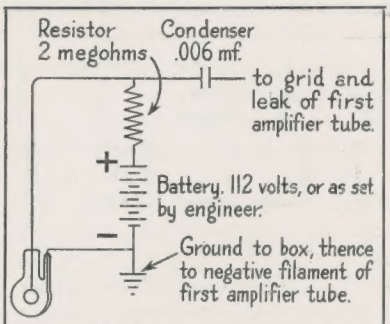

Fig. 4. Electrical connections of the photo-electric cell in movietone.

out and over the circuit to which the cell is connected.

And now for the "valve" action. The amount of light entering the cell exactly controls the amount of electrons released, hence it controls the strength of the current flowing from cathode to anode in the cell, and in the circuit to which the cell is connected. It does this just as effectively and as accurately as a valve in a water pipe controls the amount of water flowing as it is opened wider or closed more.

Every line and graduation of density in the film sound band has its proportionate effect upon the current volume, and in this manner the current volume becomes an absolutely true electrical copy of the sound record impressed upon the film sound band, which is thus sent forward to the amplifiers and by them to the loud speakers.

Figure 4 illustrates the connection of the photo-electric cell to the battery and to the first stage of sound amplification. The cell is indeed the "electrical eye" of sound apparatus. You must handle it carefully and treat it with due respect. Do not permit it to be subjected to intense heat, unless you wish to ruin it. Do not tighten the supporting clamp too tightly. Tight clamping may break the glass and a cracked tube won't work. Be very careful of the seal-off, as well as of the seals around the wires. A broken seal puts a tube out of commission. Make sure that the opening faces the light source squarely. It is not impossible that the projector vibration will loosen and turn the cell, so check up on this every day. Be very sure the glass over the opening in the cell is entirely free from dirt and oil. This is very important. Never examine a cell with a strong light, such as a concentrated flash light beam, when it is connected in circuit.

The wire connected to the ring anode must be well soldered to the amplifier connection, but in doing this don't permit the soldering iron to touch the glass of the cell—that is unless you want a ruined cell. The wire from the cathode, (light sensitive material), must connect to the amplifier box.

FLICKERS

Life is getting more and more complex. About the only line you can get on things these days is a headline.

An honest confession may be good for the soul but it plays the devil with many a lawyer's fee.

Not all sweeping victories are won at the polls. Look what the vacuum cleaner did to the broom.

Woman wants to enjoy the rights and privileges of man. But, for that matter, so does man.

About all a lot of women going down the street are wrapped up in is themselves.

Many hands make light work. If they didn't the electric bill wouldn't come around so regularly.

The golden rule isn't a yardstick, but it takes the measure of many a man.

The only book learning most people are interested in is pocketbook learning.

One kind of deal a lot of people are always getting mixed up in is an ordeal.

If a fellow has money to burn most any girl is a good match for him.

Yes, life is mostly ups and downs. Frameups and showdowns.

A Warning

FROM Thomas McNamara, Projectionist Waltham Theatre, Waltham, Mass., and Amateur Radio Experimenter (Station NU1-CML), comes a most interesting letter. I am taking the unusual course of printing the writer's name, though I'm afraid I'll have to give him a bit of a jacking up. Brother McNamara says:

"Dear Mr. Richardson: It certainly is a tonic to see your name signed to editorials in Movietone Bulletin. These weekly treatments are, I am very certain, appreciated by movietone men. They are little less than a life saver to those who started to study a little late." (Years late, you mean, don't you? Ed.)

"I read with interest what you had to say with regard to determining just when a tube is in need of replacement. Owing to the many things to be considered it can hardly be said it is possible to determine that point by any one sign. In my opinion a tube would be past its term of usefulness long before its filament would begin to show bright spots. Then again a tube would work inefficiently because of poor contact, and some men are likely to wait until the filament shows signs of spots before taking action, unless the service man himself makes a check.

The first sign of trouble will make itself manifest in the plate current value. The instruction book suggests the maximum and minimum amount of current. If it increases or decreases, the projectionist should look his outfit over and determine and remove the cause.

In some sets "C" batteries are used to control the polarity of the tube grid, thus insuring correct action in the tube. Any decrease in voltage in these batteries will operate to increase the plate current. Sets using a section of the transformer will show a variation in "C," in "B" and in "A" voltage if there is variation in the transformer primary voltage. One way to locate a poor tube when using sets of this kind is to secure an A C voltmeter and measure the line voltage. If it is found to be normal, and the plate current of a tube does not come up to normal, then that tube is defective.

On sets using "A" and "C" batteries, the best method is to permit the batteries to stand a full half-hour after charge, and then to light the filaments to the proper temperature. Next make a careful check of the "C" battery voltage and check up the plate current. If the "C" battery voltage is correct and the plate current is low, then you may be sure the filament is loosing its activity and the tube should be replaced. True, it might be possible to bring the plate current back to normal by increasing the temperature of the filament, but that would only hasten the complete destruction of the filament. Moreover, the tube might give out during the running of a reel, which certainly you cannot afford to chance.

Some projectionists make it their practice to use weak tubes in the motor control box, or in the rectifier sockets. If the activity of the filament is too weak for one duty, then it should be immediately discarded, in order to insure correct operation of the set as a whole.

It is permissible to use a weak tube in that manner strictly as an emergency stop-gap, but never use a tube as an amplifier that has been used as a rectifier tube or in the motor control box.

Make a friend of your service men. Those birds have oodles of dope packed away in their noodles. If you impress them favorably, and they think you will apply the information imparted in a safe and sensible way, they will be only too willing to explain many things."

Friend McNamara then goes on to tell us about several experimental stunts he has pulled with his outfit, but I don't think it good policy to publish them, for the reason that it might encourage those who have less knowledge of sound apparatus to try them out, and to invent others, which is very, very dangerous and therefore not desired. The apparatus is highly efficient when it is in perfect order. It has, however, been truly said: "A little knowledge is a dangerous thing," and that old "saw" certainly holds goods with relation to sound equipment. You have taken charge of complicated apparatus which must be adjusted in some of its elements with great precision. It has been tried and adjusted by competent engineers who understand it and all its parts thoroughly.

It is not reasonable to presume that men who know relatively little about the theory upon which it operates, or about the relation of one part of the equipment to another, can work benefit to it by attempting to apply their own ideas to its improvement. On the other hand, they may do incalculable harm.

If the projectionist has any idea which he thinks might have value, if he will send it to me, the editor, I will myself place it before the engineering staff and see to it that he gets due credit if it is found to be feasible.

The stunts brother McNamara describes might do no harm if attempted by a man who knows just what he is doing. McNamara is a competent radio experimenter and engineer, or so I understand him to be. There is little fear that he will do any harm, **but** to publish such things and thus encourage those less competent to experiment might do a very great amount of damage.

I cannot find words strong enough, or type large enough to adequately warn all projectionists to **refrain, absolutely, from making any experiments of any kind whatsoever in connection with movietone equipment.** As you study and learn, talk with your service engineer. Explain what you have learned and ask him if you may do certain things. If you can convince him you are competent, and what you wish to do is all right, he will gladly permit you to do it, but don't, **don't, DON'T** try to apply knowledge which you may later, (after the damage has been done), find you did not really possess. The service engineer is your friend, not your enemy. If you can handle the equipment well, that means less work for him, so he is more than glad to have you do it. He knows, however, better than you do, how relatively little the average projectionist knows about such equipment at this stage of the game, hence he has to be shown. All right! Show

him if you can, but don't get sore if you can't. He knows best.

Incidentally, all movietone projectionists are urged to read and **study** the articles prepared by the editor of this bulletin and published in the American Projectionist and Better Theatres Section of the Exhibitors Herald-World. They are right up to date and correct in every particular. I have each one of them carefully examined by the Electrical Research Products engineering staff and any necessary corrections made before publication.

A Beneficial Scare

YES, men, that is precisely what it was. A scare, and it did every one of you a lot of good, too. For twenty years I have been coaxing you to study your business. I have scolded you, ridiculed you, and in general made something of a nuisance of myself, from your viewpoint, I suppose.

But when sound synchronization came rather suddenly and entirely unexpectedly upon you, there was what amounted to a mad scramble and an attempt to cram into your brains in a few weeks what should have been accumulating gradually there over a period of many years.

Of course, that could not be done in any adequate way, and through failure to grasp the fact that motion picture projection is a really big and important task, requiring much knowledge to work in it efficiently, those of you who depended wholly upon "practice" for your knowledge now find yourselves faced with a very serious situation.

Well, men, what is done is done and cannot be mended. I think you all now realize your error, and if you will really dig in and, using the relatively small amount of knowledge you have gained through practice, really study the technique of your business, you will get by all right, though not nearly so easily or so well as you would have done had you taken the right course in the beginning.

However, don't make the same mistake again. The day of "operating a machine" is now definitely passing into oblivion. You will still do that, of course, but I think you all know that you will have to do very, very much more than that.

In the matter of movietone the Fox Case Company will give you all the help possible. Don't forget, either, that the Fox Case Corporation is the first producing organization that ever offered the projectionist any recognition or help of any sort whatsoever. It is the first producing corporation which gave the slightest indication that the work of projection was held as of any importance or the projectionist worthy of recognition and help. I, F. H. Richardson, am myself saying that—not the company.

They have proven themselves your friends and, gentlemen, it is up to you to see to it that their product, no matter under what producing company's name it appears, suffers no neglect or abuse at your hands. One good turn deserves another, and if you don't handle your equipment, including the fader, well, when a movietone is on, then you are advertising yourself as being unappreciative and ungrateful, and that's that.

Care of Film

WELL, Big Boy, are you taking good care of the movietone film entrusted to your care? The very best possible care, I mean. You know film was, even before sound was added, a delicate and rather easily injured article. There were plenty of things got done to it in the way of injury in the old days, but the possibilities for damage to the show through damage to the film have been largely increased, now that we have a sound band.

You know when **you** receive oil-smeared film **you** say a lot of rather uncomplimentary t h i n g s about the oil-mad projectionist who did the damage. That's quite true, is it not? Well, Big Boy, can **you** hold **yourself** entirely guiltless? You can? Well, well, well! That's just fine. We will give you a white mark two inches wide and ten feet long.

But how about that unsteady picture you had the other day, in which the sound was not so good, either? The trouble was due to strained sprocket holes caused by some chap who had those films before you got them having a too-heavy aperture tension, plus possibly badly worn intermittent sprocket teeth.

How is **your** aperture tension? How long since you tested it and how did you do it? Did you follow the Bluebook instructions, (page 637, Vol. 2), or did you just set it "by guess"? Also how are those sprocket teeth? How long since you examined them with a magnifying glass?

Then that scratched sound band you had wished on you by the exchange a couple of weeks ago. Nice, wasn't it, what? Just loved that, didn't you?

What's that! You never scratched any because you examine the sound gate carefully every time before you thread? Well, that's just splendid. Keep up the good work.

Remember, brother, that if you do just a little bit of damage to film and the next fellow does just a little and the next and so on, it will be but a very short while until the film won't be worth a four-year-old-dollar-and-a-quarter straw hat, and many theatre audiences must meanwhile suffer for each of those little bits of damage, and the work of many projectionists must suffer, too.

By the way, men, while I think of it, don't store film in a hot, dry place without keeping water in the film storage tank. Film is subject to the fierce heat of the spot and dries out a lot in any event. Use a little judgment and common sense and store it where it will absorb moisture, rather than lose yet more of it. This is especially important in very dry weather or in dry climates.

That Sound Gate

Don't forget that sound gate. Be very sure it is perfectly clean before you thread in a film. It is awfully much better to be safe than sorry because you neglected your duty and scratched a lot of sound band.

Being sure the sound gate is clean is a case of an ounce of prevention is worth a pound or more of injured or ruined sound band.

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VOLUME I, No. 41 OCT. 13, 1928

Movietone Projectionist

YOU are a movietone projectionist! You are just a wee bit proud of being one of the movietone "gang," aren't you? If you are not you certainly should be.

But you are, though, just as I, the editor of your bulletin, proud of being affiliated with a live-wire organization which is daily creating what we may well call one of the wonders of the ages?

Yes, men, it is all of that. "Wonder of the ages" is in no degree an exaggeration, because while the Wise Ones proclaim that we cannot now and or ever will create life, still movietone is making a remarkably excellent imitation of it. Moreover, when we finally have available the right color process—and have it we will, in due time, mark you—I'm saying unto you we will be able to have what amounts to, to all intents and purposes, living men and women where no men or women actually are.

Movietone will and now does in effect create a situation in which this country of ours will have perhaps ten thousand presidents, all really the same person, yet all appearing, walking and talking in ten thousand widely separated places on the same day, each appearance having all the effect of an actual personal one.

Putting it another way, movietone makes ten thousand duplicates of a president, each of which will appear and talk to a different audience at the same time. Moreover we are able to send our movietone duplicate President over seas to appear personally before foreign audiences and no one will get all "het" up about the President leaving the country, either. And what movietone can do with presidents it also can do with our great singers, musicians and others.

Yes, men, I'm real proud to be identified with such a thing and you should be, too. We don't forget that in the last analysis the excellence of each movietone production, as the public sees and hears it, lies in the hands of the projectionist, and we look to you to make good, boys.

We'll willingly do any reasonable thing to help you do it, too, but whether you do or not make good depends largely upon how much pride you have in your work, and whether or no you will make the effort necessary to the production of the best possible results.

There is an old "saw" which reads: "There is no excellence without great labor." There never was a more true saying. In motion picture projection, as in everything else, careful attention to detail is absolutely essential. The careful projectionist doesn't "guess the tubes, the horns, etc. are all right." He examines, tests them and **knows** they are O. K.

Movietone is your friend, men. It is up to you to **make good** and thus be movietone's friends.

Talking about efficiency, as somebody always is, consider the electric light company. It has more live wires working for it than any other organization on earth.

Sprocket Idlers

FROM a New York City projectionist comes this inquiry: "Brother Richardson: I have had some argument concerning the correct distance of sprocket idlers and the intermittent sprocket idler shoe from the face of the Simplex sprockets. Will you be good enough to advise us in this matter? We find the Bulletin to be very helpful. Don't quite know what we would have done without it."

It is our desire to make the Bulletin genuinely helpful. We would appreciate your aid in this, however. Let the editor hear from you occasionally as to difficulties encountered, if any. Advise us of any little operating "kinks" you may have discovered. It won't injure you in the least to have them known and it will help your brother movietone projectionists.

As to your questions, you will find them answered fully in general instruction No. 12, page 639 and Simplex instruction No. 31, page 722 of Volume 2 of the Bluebook of Projection. There is no absolutely fixed rule for idlers. They may be set a bit closer if only new film is being used than where the film is old, with many thick, stiff splices. A good and safe rule which will do very well under all conditions is to set them just two thicknesses of film (12/1000) of an inch away from the sprocket face. If you are running all new film, or film in good condition, this may be reduced, with some advantage, to about 8/1000.

Be very careful, however, that both ends of all sprocket idler rol-

lers are set exactly the same distance from the sprocket face. Failure to attend to this item, or a too-close setting, will tend to cause the film to climb the sprocket teeth, with resultant serious damage to it.

NOTE: Don't fail to put **one drop** of rather thin oil on each idler roller every day, working it well into the bearing and carefully wiping off all surplus.

As to the Simplex cradle or intermittent sprocket shoe, it must be so adjusted that it fits the curvature of the sprocket perfectly, of course, and so that it will hold the film snugly to the sprocket, with sufficient movement to permit wide, stiff splices to pass through. About one-sixty-fourth of an inch is the distance recommended by the Simplex manufacturer and it is well always to follow their recommendations. One-sixty-fourth of an inch is about the thickness of an ordinary business card. There is nothing necessarily precisely exact about this adjustment as measured in thousandths of an inch. Just use a bit of judgment and ordinary common sense.

How Sound Travels

JACK LEVINE, Projectionist, Rialto Theatre, Leominster, Mass., writes thus: "Dear Brother Richardson: There has been an argument between myself and a friend as to how sound travels, and just what it is. My understanding is that if a bell be rung, the metal gong vibrates, and in so doing causes the surrounding air to vibrate at the same rate.

"When the metal of the gong moves outward it pushes the surrounding layer of air outward, thus crowding the particles of air together, this crowding effect being transmitted through the air in diminishing force until it finally dies away. When the metal recedes, or moves back, a space is left corresponding to a partial vacuum, and in this the particles of air can again separate or move further apart.

"And thus, crowded and thin layers of air succeed each other in rapid succession, traveling outward, as I have said, in all directions.

"When the successive layers of what I may term compressed and rare air strike the drum of the ear, it in turn vibrates, the vibrations traveling through three small bones to the fluid contained in the inner ear, which in turn affects delicate nerves, giving us the sensation of sound. I would like to know, through Movietone Bulletin, whether or no this is correct."

Friend Levine, so far as I know what you have set forth is entirely correct. Moreover it is remarkably well put, or so it seems to me. I shall, however, submit it to our sound engineers. If they have any objections or corrections they will be noted.

The usual way of stating it is that sound travels in waves, but after a "wave" would be, it seems to me, exactly what you have described rather cleverly. I might add that the more rapid the successions of waves, or compressions-rarifications, the shriller the sound —the higher its pitch. That is why the small bell makes more shrill sounds that the larger one. It vibrates more rapidly.

Instruction Study

WE cannot too strongly recommend to you that you study your instruction books often and thoroughly. Remember always that in nearly all the affairs of life a "little knowledge is a dangerous thing." You will never be able to know your sound equipment too well. Study the articles now running in the American Projectionist and in the Better Theatres Section of the Exhibitors Herald-World. It is highly important that you do so. Study the articles in Movietone Bulletin. All these articles are prepared by the editor of your Bulletin with great care and are examined and, when necessary, corrected by the engineering staff of the Electrical Research Products, Inc. You therefore cannot possibly be led astray by them.

Just now we are trying to give you an understanding of the fundamentals. That, of course, is more or less dry, but as the work progresses, it is believed that the interest will be much more keen.

A real friend is one you can swear by instead of at.

FLICKERS

It is too bad there wasn't a movietone recording apparatus at Babel. That would have been one shot the projectionist would not need to worry about when putting it over to an audience.

There are reformers who are trying to make it against the law to smoke. If you want to make them sore tell them their idea is a pipe dream.

Nature provides for all its creatures, but one can't help wondering how the moth managed in the days when they wore cast-iron suits.

One never knows how many things a woman can get into a vanity case till he sees her drop it on the sidewalk.

What the severest punishment in hell is is a question. Possibly it is finding out a lot of people you thought ought to go there didn't.

Some modern girls tell mother everything. Mother can write it up for the confession magazine better than they can.

Times have changed. Nowadays it is safest to keep open house behind closed doors.

Perhaps it is correct to call the poor working girl a chicken. She scratches for herself.

An enviable record is one the neighbors don't play on their phonograph all the time.

The biggest taint about tainted money is tain't yours and tain't mine.

Woman is so inconsistent. She is willing to go half-dressed, but never willing to go half-fed.

Talents differ. A soft answer turneth away wrath but a soft drink doesn't.

Give movietone a show and it will give the audience a show.

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The Fader and Its Action

COMES the following from the great city of Chicago.

"The Bulletin most certainly is a help. It makes things clear which were more or less mysterious and puzzling to us who have to handle the apparatus. More than that, the Bulletin has directed attention to many faults in ordinary projection practice which would work, and as a matter of fact were working harm to movietone sound effects.

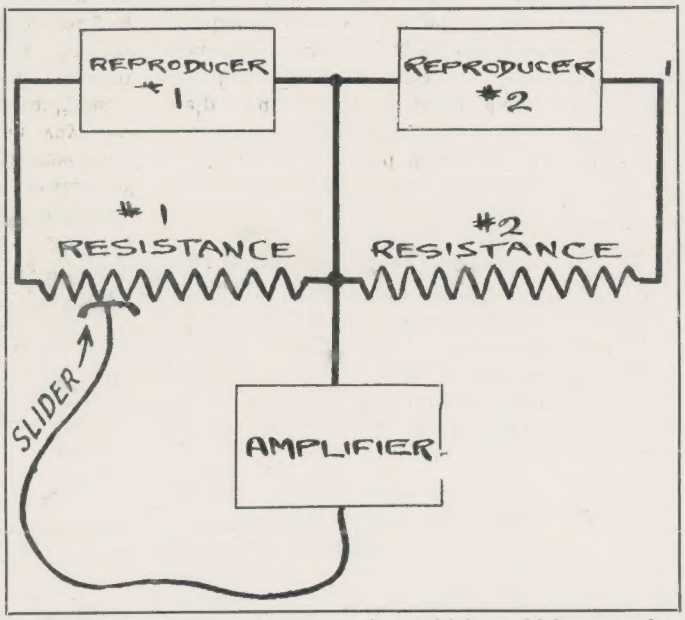
True, most of us knew of them, but 'familiarity breeds contempt', and I believe we need a periodical 'jacking up,' which is perhaps just a bit more effectively administered through the Bulletin than through the other mediums you have for years used for the purpose, excellent though they be.

Just now we are all rather keen about sound, therefore what appears in the official Bulletin gets pretty close attention. At least that is my own impression of the matter.

And now, like most others who write, I want to ask a question. In projecting movietone we use a fader. It must be some sort of a resistance unit, but I, for one, want to know just what it really consists of and just how it operates. Will you tell me—and all the other Bulletin readers?"

I certainly will. By the way, though, this Bulletin is issued gratis. It is published to help you. It costs you nothing, but if you think the Fox Case Corporation picks it off a Christmas tree you may guess again. Don't every one of you think it would be but fair and right to drop a line to the Bulletin, advising us whether or no you find it interesting and helpful? That might be one way to insure its continuation indefinitely. It is nothing more than natural to presume that the corporation will not continue to meet such a really large expense for a long extended period of time, unless you at least indicate some degree of interest and appreciation.

PARTS OF THE FADER



And now as to the fader. You are right. It is a resistance unit. For the purposes of understanding its action the accompanying diagram will serve very well. Many of you old timers will remember the Edison rheostat used in projection along about 1907, in which a single length of wire was coiled around an asbestos covered metal core, with a contact shoe which could be moved up and down, thus adding or eliminating resistance. The diagram utilizes the same idea, though in practice it is done a bit differently, as will be explained.

Examining the diagram we see two coils of resistance wire, each of which is connected in series with the pick-up-amplifier circuit of a projector. In the diagram it is evident that the full voltage generated by the pick-up is impressed across the two ends of the resistance. It then follows that between one end of the resistance and, say its center or middle, there will be only half the pick-up voltage; similarly at a point one-quarter of the length of the resistance there will be only one quarter of the pick-up voltage, and so on. Therefore as the slider is moved to the left, the voltage it picks up from the resistance coil will increase, hence the volume will increase. If we

move it to the right the opposite effect will, of course, take place. That is all there is to that, except to remark that the slider is connected with the fader knob.

However, when we reverse the fader from red to white, or vice versa, we move the slider over to the opposite resistance coil, where the same effect is applied to the pick-up-amplifier circuit of the other projector. It is of course immediately evident that the amount of resistance applied to either circuit will be dependent upon the position of the slider.

However, while that is the effect obtained, it is not obtained in just that way, in so far as the mechanics of the device be concerned. In practice, instead of the single coil and slider shown, there are, mounted within the fader casing, a number of contact studs—one for each number on the fader panel. There also is a contact lever, connected to the fader knob, which is moved by the knob and makes successive contact with the aforesaid studs, between each pair of which is connected just sufficient resistance to effect the change in current flow, hence in volume, which will be detected by one of average sharpness of hearing.

There, Chicago, that is all there is to one very important item of the apparatus, the fader. At any time you want any other part of the apparatus explained, advise the Bulletin and it will be done.

Projector Optical System

(Continued from Bulletin No. 39)

THE rotating shutter is, or at least it must be considered as a part of the projector optical system, for the reason that it is very intimately connected therewith. There have been many, and possibly may still be some projectionists who believe the shutter supplied by the projector manufacturer is and must be the correct thing to use, and that it requires no attention from the projectionist, except to "set" it.

That view is entirely wrong. The projector manufacturer cannot possibly know what conditions any given projector he turns out will be called upon to work under, hence he must, in the very nature of things, in order to avoid trouble, fit his stock projector with a shutter master blade of sufficient width to take care of any except the very worst possible conditions, depending upon the local projectionist to trim the shutter down to fit the conditions.

Projectionists know, or should know, that any width of shutter master blade over and above that required to eliminate travel ghost is bad. It causes waste of light, hence of electric power. Also it may and probably does increase flicker tendency.

The best procedure to follow to determine the shutter position with relation to the lens, (its distance therefrom), and the correct width of master blade, is as follows.

Secure from a photographer a piece of black paper, or paint a bit of board black. A board oiled and then smeared with black earth will do. The "black" is merely to kill the light glare. Project the white light to the screen, either with the projector standing still or in operation. Hold the paper or board in front of and move it slowly away from the lens, observing whether the diameter of the beam increases or decreases. If the former, then the shutter should be located as close to the lens as you can get it. If the latter, then experiment until you have found the point where the beam diameter is least, which will be the correct shutter position.

Another very effective method when plano convex condensers are used, is to move some opaque object slowly down through the light beam at different distances from the projection lens, until a point is found where a shadow leaves both top and bottom of screen at the same time, meeting exactly in the center of the screen. This is the correct shutter position. I am not certain whether this is effective with the reflector type lamps or not. Am about making experiments to determine that point. Will report later.

Of course, in some cases the point may be so far out that it will be impractical to locate the shutter there, in which case you will have to just do the best you can. The point is to get the shutter as nearly as possible at the most narrow point of the light beam. At the dissolving point, (where shadows meet in center), is ideal, because there we get an almost perfect dissolving effect and can use a blade a trifle less wide than at any other point.

(Continued in a later issue.)

FLICKERS

In union there is strength. Otherwise a lot of us would pull a one-man strike.

Girls should beware of being a shoemaker's first love. He always sticks to his last.

These days if a fellow has good stuff in him everybody wants to know where he got it.

We have always envied an aesthetic dancer. She gets there by leaps and bounds.

There is one pretty sure test. If he thinks the street car has revolving doors he is drunk.

Diet doesn't help skinny girls much. When they walk down the street they show everything but improvement.

A hick town is a place where the women still leave the table when the men start telling stories.

Many a woman is the light of a man's life because she keeps him in the dark.

Don't pay any attention to the bird in the clock. It is a little cuckoo.

Billygoats are droll creatures to have around but don't let one make you the butt of his joke.

There are degrees of dumbness. Some people think a campaign address is where a candidate gets his mail.

You can't hold a good man down, they say. But bandits have learned it is profitable to hold him up.